

Honors Chemistry - Course Outline

1 Nature of Science

This topic contains an overview on laboratory safety, chemistry lab equipment, matter, energy, and change, classification of matter, measurement, density, and dimensional analysis.

2 Atomic Structure & Energy of Electrons

This topic contains a brief history of atomic theory, the quantum mechanical model, electron configuration, the structure of the atom, relative atomic mass and average atomic mass, moles, and the electromagnetic spectrum.

3 Periodicity

This topic contains an overview of the periodic table, periodicity, ionization energy, atomic and ionic size, electronegativity, periodic properties, and periodic trends.

4 Bonding & Compounds

This topic contains a chemical bonding overview, chemical nomenclature, ionic formulas and nomenclature, covalent formulas and nomenclature, acid formulas and nomenclature, mole problems with compounds, percent composition of an element in a compound, percent water in hydrates, empirical and molecular formulas of compounds, and oxidation numbers.

5 Reactions

This topic contains the basics of chemical reactions, reading equations, balancing equations, the 5 types of reactions, predicting reaction products, rules for oxidation numbers, redox reactions, a note on the kinetics of reactions, and net ionic equations.

6 Stoichiometry

This topic contains stoichiometry, mole to mole problems, mole to mass problems, mass to mole problems, mass to mass problems, gas stoichiometry, solution stoichiometry, percent yield, and limiting reactant.

7 VSEPR/IMFs

This topic contains a chemical bonding overview, ionic bonds, covalent bonds, metallic bonds, intermolecular forces, lewis structures, VSEPR theory, and hybridization.

8 States of Matter

This topic contains states of matter, density comparison, more on solids, liquids, and gases, phase changes, phase diagrams, heating and cooling curves, and math with phase changes.

9 Gas Laws

This topic contains the kinetic molecular theory and behavior of gases, the gas laws, and gas stoichiometry.

10 Solutions

This topic contains solutions, colloids, and suspensions, solubility factors, solubility, expressing concentration of solutions, colligative properties of solutions, dilutions, and dissolutions.

11 Acids & Bases

This topic contains the general properties of acids and bases, neutralization reactions, theories of acids & bases, conjugate acids and bases, pH and pOH scales, titrations, equilibrium with weak acids & weak bases, and molar mass of unknown acids or bases through titrations.

12 Equilibrium

This topic contains general equilibrium concepts, weak acid equilibrium, and applications of the equilibrium constant.

13 Thermochemistry

This topic contains energy changes during chemical reactions, potential energy diagrams, thermochemical equations, enthalpies of combustion, thermodynamic favorability, hess's law, enthalpies of formation, entropy, gibbs free energy, and specific heat.

14 Nuclear Chemistry

This topic contains the chemistry of the nucleus, history of radioactivity, types of radiation, nuclear chemistry terminology, stability of isotopes, decay series, natural vs. artificial radioactivity, half-life of radioisotopes, radioactive decay, fission & fusion, uses of radioactivity, and properties of radioactive elements.

15 Organic Chemistry

This topic contains an introduction to organic chemistry.